

4.3 Adaptation of the honeybee (*Apis mellifera*) tunnel and field test systems (EPPO 170 & OECD 75) for bumblebee (*Bombus* spp) testing

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Abstract

According to the recently drafted EFSA guidance document ¹, non-*Apis* bees will be considered for European registration of plant protection products in the future. If lower tier testing and/or risk assessment (including exposure refinement) indicate unacceptable risk for non-*Apis* bees, corresponding higher tier testing may be required, comparable to honeybees for which approved guidance documents for semi-field and field testing are available (e.g. EPPO 170 ² and OECD 75 ³).

For bumblebees higher tier studies performed in the past mainly conformed to side-effect testing of integrated pest management programs in greenhouses. The number of scientific publications on bumblebee semi-field and field studies has recently increased, some of which specifically focussed on mortality, brood production and overall fitness at the colony level, yet, several aspects of respective study designs may hardly be implemented routinely in GLP (Good Laboratory Practice) settings for standardized testing.

Here, we present a GLP-compliant test design for bumblebee semi-field and field studies that allows for feasible and precise monitoring of colony growth, brood development and fitness relevant parameters, such as queen production. The test design is based on setting up multiple batches of bumblebee colonies at comparable life-cycle stages for each tunnel or field treatment. Colonies are generally left undisturbed and sampled batch-wise at distinct intervals over the course of the study (covering exposure and post-exposure phases) using destructive freezing of whole colonies. Quantifications of all developmental stages can be assessed by dissecting previously frozen bumblebee colonies. Relevant endpoints assessable with the proposed test design are outlined and limitations and problems encountered during the performance of such studies are discussed in context.

References:

- EFSA (European Food Safety Authority). 2013. EFSA Guidance Document on the risk assessment of plant protection products on bees (*Apis mellifera*, *Bombus* spp. and solitary bees). EFSA Journal 2013;11(7):3295
- EPPO (European and Mediterranean Plant Protection Organization), 2010. PP 1/170 (4): Side-effects on honeybees. 40, 313-319.
- OECD (Organization for Economic Cooperation and Development), 2007. Guidance document on the honey bee (*Apis mellifera* L.) brood test under semi-field conditions. Series on Testing and Assessment, No. 75. 3-27.